[RANGE OF CLAIMS]

[CLAIM 1]

A cross-linked foaming method, comprising:

preparing at least one foaming material for a cross-linked foaming, the foaming material processed to have a plane or three-dimensional shape with the cross-linked foaming suppressed ;

forming at least one interfacing pattern on a surface of at least one of the foaming material using at least one interfacing material that prevents chemical and physical interaction between the foaming materials; and

forming a cross-linked foam by foaming the foaming material having the interfacing pattern thereon, the cross-linked foam having a foam body and an internally-formed surface.

[CLAIM 2]

The method according to claim 1, further comprising combining another foaming material with the foaming material having an interfacing pattern thereon before a process of forming the cross-linked foam.

[CLAIM 3]

The method according to either of claims 1 or 2, wherein the foaming material is selected from an EVA-based film and material having a plane or three-dimensional shape with an enough surface roughness to easily form the interfacing pattern thereon.

[CLAIM 4]

The method according to either of claims 1 or 2, wherein the foaming material is selected from a group consisting of synthetic resins such as an ethylene-vinyl acetate (EVA)-based resin and a polyethylene-based resin, a copolymer of resins, a natural or synthetic rubber, and a composite material including at least one material selected from the synthetic resins and the copolymer and at least one material selected from the natural rubber and the synthetic rubber.

[CLAIM 5]

The method according to claim 1, wherein the interfacing material is selected from a group consisting of liquid phase materials, solid phase materials, and film-type materials.

[CLAIM 6]

The method according to claim 1, wherein the interfacing pattern is formed by one of methods such as a printing, a transcription, a coating, a deposition, a spraying, a cloth attachment, an inserting, an attachment and diverse modifications of above methods.

[CLAIM 7]

The method according to claim 1,wherein the interfacing material includes at least one foaming agent selected from foaming agents that are same or different kinds of the foaming agent for the foaming material.

[CLAIM 8]

The method according to claim 1, wherein if two or more interfacing patterns are formed, each of the interfacing patterns is formed using one of same or different material.

[CLAIM 9]

The method according to claim 1, wherein the process of forming the cross-linked foam is executed either by pressure cross-linked foaming method or normal pressure cross-linked foaming method.

[CLAIM 10]

The method according to claim 1, wherein the process of forming the cross-linked foam is executed by a modified method either of the pressure cross-linked foaming method or normal

pressure cross-linked foaming method.

[CLAIM 11]

The method according to either of claims 9 or 10, further comprising adding a material same as or different from the foaming material to a remaining space of a molding die before the process of forming the cross-linked foam when the process of forming the cross-linked foam is executed by the pressure cross-linked foaming method.

[CLAIM 12]

The method according to claim 1, further comprising injecting one of air and liquid material into a space formed by the internally-formed surface of the cross-linked foam after the process of forming the cross-linked foam.

[CLAIM 13]

The method according to claim 1, further comprising re-molding the cross-linked foam after the process of forming the cross-linked foam.

[CLAIM 14]

The method according to claim 13, wherein the re-molding is performed together with one of materials that are the same as or different from the cross-linked foam.

[CLAIM 15]

The method according to one of claims 1, 13 and 14, further comprising inserting at least one of materials that are the same as or different from the foaming material into a space formed by the internally-formed surface after forming the cross-linked foam or re-molding the cross-linked foam.

[CLAIM 16]

The method according to claim 15, further comprising re-molding the cross-linked foam after inserting the material into the space formed by the internally-formed surface.

[CLAIM 17]

The method according to one of claims 1, 13 and 14, further comprising after the process of forming the cross-linked foam:

forming an air passage extending from a surface to a space formed by the internally-formed surface of the cross-linked foam;

inserting one of materials that are the same as or different from the foaming material into the space through the air passage; and

re-molding the cross-linked foam after inserting the material.

[CLAIM 18]

The method according to either of claims 15 or 17, wherein the different material from the foaming material is selected from a group consisting of gas, liquid and solid materials.

[CLAIM 19]

The method according to either of claims 1 or 2, further comprising rolling up the foaming material having the interfacing pattern thereon before the process of forming the cross-linked foam.

[CLAIM 20]

The method according to either of claims 1 or 2, further comprising adding a different material from the foaming material to the foaming material having the interfacing pattern before the process of forming the cross-linked foam.

[CLAIM 21]

A cross-linked foam fabricated by any of claims 1 to 20.

[CLAIM 22]

A cross-linked foam, comprising:

a foam body; and

at least one inner cavity structure formed inside the foam body;

wherein the foam body and the inner cavity structure are formed simultaneously.

[CLAIM 23]

The cross-linked foam according to claim 22, wherein the inner cavity structure is connected to at least one surface of the foam body.

[CLAIM 24]

The cross-linked foam according to claim 22, wherein the foam body includes at least one air passage connected to the inner cavity structure.

[CLAIM 25]

The cross-linked foam according to claim 24, further comprising a valve at the air passage to control an inflow and an outflow of air and moisture.

[CLAIM 26]

The cross-linked foam according to one of claims 22 to 24, wherein the inner cavity structure is filled with one or more materials that is the same as or different from the foam body.

[CLAIM 27]

The cross-linked foam according to one of claims 22 to 24, wherein molded material made of or from the same material as or different material from the foam body is inserted into the inner cavity structure.